

# Transforming healthcare:

## The potential of personalised prevention



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### Introduction

Healthcare systems across the four nations of the UK have been experiencing increased demand for their services for many years. The main contributing factors are an increasingly ageing population (18.9% of the UK population was aged over 65 in 2024 according to the Office for National Statistics projections<sup>1</sup>) and a rise in non-communicable diseases, estimated in 2019 to account for 89% of deaths in the England<sup>2</sup>. As the population continues to age, and the costs of healthcare increase, it has been predicted that to maintain current levels of service, Government spending on healthcare would need to increase from an estimated 7.2% of GDP in 2018-19 to 13.8% of GDP in 2067<sup>3</sup>.

Other factors also impact health and wellbeing. Significant health inequalities exist in the UK, driven by socioeconomics, ethnicity, and geography, highlighted very starkly during the early stages of the Covid-19 pandemic<sup>4</sup>. Climate change is likely to have an increasing impact on human health, with air quality and extremes of temperature, especially heatwaves, adversely affecting those with chronic respiratory and cardiovascular diseases<sup>5</sup>.

These trends paint a worrying picture of ever increasing and unsustainable pressure on healthcare systems across the UK. This issue is not limited to the high demand for healthcare services; it also includes the broader economic impact of chronic ill-health within the workforce, which adversely affects national productivity.

Recognising the need for change, the current UK Government is consulting broadly on building an NHS fit for the future. Now, more than ever, long-term thinking and bold actions are required to transform our healthcare systems. A shift

to focus healthcare towards the prevention of disease and promotion of health, embracing the latest advances in research, innovation and technology, surely has a central role to play.

### Precision medicine

Precision, or personalised, medicine is widely considered to have the potential to transform how diseases are diagnosed, treated and prevented, by considering an individual's unique genetic, lifestyle and environmental factors. Key to precision medicine is the use of genomic data to understand an individual's susceptibility to disease or their response to different treatments. We know from multiple studies that early diagnosis and intervention improve health outcomes. And in the UK, Our Future Health<sup>6</sup> is a large health research programme which is building a cohort of 5 million adult volunteers with the aim of discovering and testing new effective approaches to prevention, early detection and treatment of diseases.

### Personalised prevention in healthcare

Personalised prevention is a key element of precision medicine and focuses on preventing the onset, progression or re-occurrence of disease. Interventions are tailored by considering an individual's biological information, alongside lifestyle, environmental, socioeconomic and cultural factors. The development and widespread adoption of personalised prevention strategies has the potential to transform healthcare provision. Key to success will be the ability to develop a comprehensive and holistic understanding of an individual's health through their life-course.

In the latter part of 2024, I chaired the expert Steering Group that supported the joint Physiological Society / PHG

Foundation project which considered how physiology, recognised for its integrative approach across molecular, cellular, systems and whole-body functions, could support the development and use of personalised prevention in healthcare. I recalled that when I was a senior leader at The Biotechnology and Biological Sciences Research Council, an horizon-scanning workshop a decade earlier had identified 'Personalised health / prevention' as an important emerging area<sup>7</sup>. During the intervening time scientific knowledge and understanding (much of which has been generated by the physiological research community), alongside technology development, have progressed to such an extent that there are now clear opportunities to apply personalised prevention approaches as part of strategies to improve individual's health and reduce the burden on healthcare systems.

The Steering Group had many in-depth discussions about personalised prevention, appreciating it is a complex and multifaceted challenge. The group saw real opportunities for physiology-led research and innovation in the development of more accurate monitoring tools, diagnostic tests, and identification and validation of novel biomarkers to track health. But it also recognised that many physiological health measurements are already captured in routine clinical practice – height, weight, blood pressure, pulse, blood glucose and cholesterol for example – and what is currently lacking is the curation of these data, over time, in a format that is readily accessible to both individuals and healthcare professionals.

Through consideration of how physiological health data could be collected and curated during an individual's lifetime the concept of the Physiology Passport emerged. The project report<sup>8</sup> was launched in Parliament in January 2025 at a discussion event jointly hosted by the Parliamentary and Scientific Committee and The Physiological Society.

### The Physiology Passport: a dynamic, long-term and integrated personal physiology profile



Conceptually, the Physiology Passport provides a means to collect, manage and present a person's physiological health information in a useful manner, potentially over decades. Much of this information already exists, but it is patchy and hard to find, so ideally it would become part of the existing, or a re-designed version of, the NHS App (in England, for example). By integrating physiological health data into existing electronic health records the parameters defining good health for each individual could be more readily established. And the Physiology Passport could then be used by individuals themselves and healthcare teams in an integrated and holistic way to monitor health and proactively intervene early if parameters change.

Like any new health-related innovation, the Physiology Passport raises a series of ethical, practical and research questions that require more detailed consideration. The challenges associated with data collection and curation, encompassing security, sharing and ownership, are of utmost importance. The need to narrow health inequalities, rather than widen them, was an area of particular concern, as reflected in the report's

recommendations. The opportunity to leverage new and emerging technologies, especially Artificial Intelligence, to analyse large amounts of health-related data were recognised. The ever-expanding repertoire of wearable devices now available to monitor an individual's health were seen as an opportunity for future data collection, notwithstanding the challenge of clinically validating new data sources. The need to ensure a future workforce that is supported to develop the skills needed as healthcare shifts to being more data-

intensive and digital was also recognised. The Steering Group, and participants at the launch event in Parliament, debated these and many other questions – deliberations that should continue into the future.

### Making personalised prevention a priority

It is hoped that the Physiology Passport report<sup>9</sup> will achieve a number of things; from highlighting the opportunity and multiple benefits that can be realised by

## Launching the Physiology Passport Putting personalised prevention at the heart of resilient health systems

Parliamentary & Scientific Committee Discussion Meeting held on 14 January in partnership with The Physiological Society



Left to right: Professor Catherine Ross, Chief Scientific Adviser, Scottish Government; Dame Melanie Welham DBE; Professor Heidi de Wet, Associate Professor of Physiology, University of Oxford; George Freeman MP, Chair, Parliamentary & Scientific Committee; Viscount Stansgate, President, Parliamentary & Scientific Committee; Dr Alistair Connell, Director of Digital Health, Our Future Health.

focusing more on prevention, including the role physiology can play, through to sparking a national debate about personalised prevention and an individual's responsibility for their own health.

To turn the Physiology Passport into reality, however, personalised prevention will need to become a key priority for multiple stakeholders. And this is where the recommendations in the report for Governments, Researchers and Funders seek to inform and shape future approaches.

It is clear that new strategically-aligned physiological and multi-disciplinary collaborative research and innovation, adopting integrative and holistic approaches, is needed to accelerate progress. Proof of principle, pilot and longitudinal studies to test feasibility and cost effectiveness will be critical, along with identification of new biomarkers. Inclusion of under-represented groups in such studies will be vital to address health inequalities. Prevention has been highlighted as one of the current UK

Government's priority areas in Health. But policy stability, along with long-term support, will be critical to incentivise the private sector investment needed to accelerate innovation, translation and implementation.

Innovative approaches to personalised prevention have the potential to shift the health of the UK's population in the medium to longer-term, reducing chronic ill-health, lowering demand on healthcare provision, and simultaneously boosting economic productivity through a healthier workforce. With the potential for such widespread benefits implementation seems to be a 'win-win'. However, there are likely to be few 'quick fixes' so a long-term view and patience will be vital. Health economists will need to consider the financial implications of change, but one thing is clear, the status quo cannot continue indefinitely and the longer it takes to implement change, the bigger the changes needed to ensure sustainability of our healthcare systems into the future. The time to embrace personalised prevention is now.

## References

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